

# **GIP Accomplishments for Year 1**

David Randall

Colorado State University

## **1. Summer School on Atmospheric Modeling**

Most of our Year 1 funding was used to develop and conduct a Summer School on Atmospheric Modeling (SSAM), which was held in Boulder Colorado on July 19-21, 2010. For 2010, the focus of SSAM was FIM, a Flow-Following, Finite-Volume, Icosahedral Model developed at NOAA's Earth System Research Laboratory (ESRL).

The program for the Summer School is shown in Table 1. The presentations and other course materials are available at <http://wrfportal.org/FIMPortal.html>.

Twenty-five students participated; a list of the students is available upon request. Demand exceeded supply: Some students who applied for the course could not be accommodated due to space limitations, which were announced in advance. When the Summer School ended, the students provided written feedback on the design and conduct of the course. The feedback was strongly positive. Copies of the students' comments are available on request.

SSAM was made possible through the efforts of ESRL scientists, whose participation was authorized by ESRL Director Alexander MacDonald. Dr. MacDonald also gave one of the opening lectures of the Summer School. A letter to Dr. MacDonald is attached to this report.

In addition, SSAM received support from NCAR. This included a significant amount of computing time, as well as use of meeting space at NCAR's Foothills Laboratory. A letter to Al Kellie, Director of NCAR's Computational Information Systems Laboratory, is attached to this report.

## **2. Class materials on global atmospheric modeling**

David Randall is currently nearing completion of a book with the working title "Atmospheric Processes in Climate," to be published by Princeton University Press. The book is aimed at undergraduates. It should appear in late 2011 or early 2012.

In addition, Randall taught a graduate-level class during the fall semester of 2010 entitled "Introduction to General Circulation Modeling." The materials used for this class are being used as the basis for a second book, to be completed during 2012.

**Table 1: Program of the Summer School held during July 2010****Summer School in Atmospheric Modeling (SSAM)**

<b>Time</b>	<b>Monday 7/19/10</b>	<b>Tuesday 7/20/10</b>	<b>Wednesday 7/21/10</b>
9:00	Welcome, Introduction, and FIM Overview -- David Randall, Alexander MacDonald, Steve Koch, Jin Lee, Rainer Bleck	Parameterizations -- Jongil Han and Jian-Wen Bao	Geodesic numerics 2 -- Jin Lee
10:00	BREAK	BREAK	BREAK
10:15	Geodesic numerics 1 -- David Randall, Jin Lee	FIM as a numerical weather prediction tool -- Stan Benjamin, Jin Lee	Vertical discretization -- Rainer Bleck, Stan Benjamin
11:15	Hybrid vertical coordinates -- Rainer Bleck, Stan Benjamin	Computational issues -- Jin Lee, Tom Henderson	Overview of some research issues -- David Randall
12:00	LUNCH	LUNCH	LUNCH
13:30	Hands-on with FIM Basic mechanics of running the model -- Brandon Lyngge, Jeff Smith, and Jim Rosinski,	Hands-on with FIM Case 1 (winter) -- Stan Benjamin, Jim Rosinski, Brandon Lyngge, and Jeff Smith	Hands-on with FIM Case 2 (summer) -- Jin Lee, Jian-Wen Bao, Jim Rosinski, Susan Sahm, Brandon Lyngge, and Jeff Smith
15:45	BREAK	BREAK	BREAK
16:00	Introduction to FIM diagnostics -- Ning Wang, Phillip Pegion and Jin Lee	Where FIM stands as a candidate model for operational NWP -- Stan Benjamin	Closing session and feedback from students -- David Randall, Jin Lee, Rainer Bleck
17:00	Adjourn for the day	Adjourn for the day	Summer school ends

**Attachment 1: Letter to Dr. Alexander MacDonald**

**Attachment 2: Letter to Dr. Al Kellie of NCAR**



*Knowledge to Go Places*

Department of Atmospheric Science  
200 W. Lake St.  
Colorado State University  
Fort Collins, Colorado 80523-1371

phone: 970 491-8474  
fax: 970 491-8693  
email: [randall@atmos.colostate.edu](mailto:randall@atmos.colostate.edu)

<http://kiwi.atmos.colostate.edu/group/dave/>

Monday, March 7, 2011

Dr. Alexander MacDonald, Director  
NOAA/Earth System Research Laboratory  
325 Broadway  
Boulder, CO 80305-3328

Dear Dr. MacDonald,

I'm writing to thank you and your staff for outstanding support of the first Summer School for Atmospheric Modeling (SSAM), which was held on July 19-21. Twenty-five students gained both conceptual understanding through lectures, and practical hands-on modeling experience.

I very much enjoyed the lectures and presentations by you and the other NOAA presenters, Jian-Wen Bao, Stan Benjamin, Rainer Bleck, Jongil Han, Tom Henderson, Jin Lee, Steve Koch, Brandon Lynge, Ning Wang, Philip Pegion, and Jeff Smith. Steve Koch, Philip Pegion, and Jeff Smith. They spent several person-weeks preparing content and slides for the SSAM lectures. Rainer Bleck, Jin Lee, and Stan Benjamin spent several additional person-weeks preparing test hypotheses, test cases, test runs, and graphics for the hands-on sessions. They then each led hands-on sessions guiding students through the experiments they had planned. It was a pleasure to see the genuine interest of all of these NOAA scientists in educating the next generation of global modelers.

Through our respective presentations and off-line discussions, Jin Lee and I exchanged research ideas about geodesic numerics. The door is open to future collaborations on that subject.

In addition to the more obvious efforts of the SSAM instructors, several people at NOAA and NCAR played key roles, often behind the scenes, that were critical to making the SSAM run as smoothly as possible.

Brandon Lynge worked extremely long hours coordinating the hands-on sessions, testing, addressing technical problems (scripting, workflow manager, system-specific issues), and responding to last-minute changes in requirements. For several key weeks he took on the responsibility for overall coordination of NOAA preparations for SSAM. He did a terrific job.

Jeff Smith also worked tirelessly to ensure that the WRF Portal could be adapted for use as a "FIM Portal" during the weeks leading up to the course. He also worked long hours implementing last-minute changes to the portal as requirements fluctuated even after the course began.

Susan Sahm and Brian Jamison assisted in customizing the web-based graphics displays to support the hands-on session. Susan also created a new customized web page that students used to display FIM results during the hands-on sessions. Susan also made test runs of cases used during the hands-on sessions.

Jim Rosinski, Paul Madden, and Tom Henderson prepared FIM source code and build and run automation for SSAM. This included performance measurement and tuning on NCAR and NOAA supercomputers and making resource estimates as requirements became more clear. It also included adding new features to FIM to support hands-on experiments. Jim also assisted during the hands-on sessions.

Craig Tierney developed a back-up plan to use NOAA supercomputers in case the NCAR supercomputer was not available.

Tom Henderson coordinated early preparations for SSAM. Tom and I exchanged many emails during the planning of SSAM, and his contributions were invaluable.

Ning Wang helped coordinate one of the hands-on sessions.

Mark Govett coordinated preparations for two weeks while Tom Henderson was out of town.

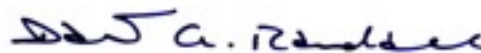
Brandon Lynge and Jeff Smith also led three dry runs of the hands-on sessions. Rainer Bleck, Jin Lee, Philip Pegion, Susan Sahm, Jim Rosinski, Ning Wang, and Tom Henderson served as guinea-pigs during the dry runs.

Finally, Cecelia DeLuca made numerous excellent suggestions during the planning of SSAM, and helped to organize the cooperative arrangements with NCAR.

In summary, you and your staff did a terrific job with SSAM. The students benefitted tremendously, as documented by the many favorable comments that we received on the course evaluation questionnaires. It seems likely that the presenters also benefitted from the experience; I know that I did. Finally, I believe that SSAM helped to raise the profile of FIM, bringing well deserved credit to ESRL and its Global Systems Division.

Thanks very much for helping to make SSAM a success.

Sincerely,

A handwritten signature in blue ink, appearing to read "David A. Randall".

David A. Randall  
Professor

cc: Dr. Steve Koch



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Department of Atmospheric Science  
200 W. Lake St.  
Colorado State University  
Fort Collins, Colorado 80523-1371

phone: 970 491-8474  
fax: 970 491-8693  
email: [randall@atmos.colostate.edu](mailto:randall@atmos.colostate.edu)

<http://kiwi.atmos.colostate.edu/group/dave/>

Monday, July 26, 2010

Dr. Al Kellie  
Director, Computational and Information Systems Laboratory  
National Center for Atmospheric Research  
Box 3000  
Boulder, Colorado 80307-3000

Dear Dr. Kellie,

I'm writing to thank you and your staff for outstanding support of the first Summer School for Atmospheric Modeling (SSAM), which was held in NCAR's EOL Atrium on July 19-21. Twenty-five students gained both conceptual understanding through lectures, and practical hands-on modeling experience through numerical experiments that were run on Bluefire.

Jennifer Williamson coordinated the venue, organized the logistics for several tutorial dry runs, worked on travel and transportation logistics with Jennie Bell at CU, managed catering and participant logistics with Connie Hale at CSU, took care of IT and physical security, maintained good communications among the various parties at NCAR, NOAA, CSU, and CU, did some workshop photography, and handled countless other details on the NCAR side. A class like SSAM just cannot run smoothly unless all of these details are handled properly. Jennifer showed herself to be a superb professional, and we could not have done it without her.

Davide Del Vento provided critical support during the hands-on sessions, often making systems changes on-the-fly to make newly-created queues work immediately for use by the students. He also served as NCAR's technical point of contact for supercomputing issues in the weeks leading up to the class.

Jose Castilleja and Katrina Smith built the wired network at the EOL Atrium. This was critical because the wireless connection in the EOL Atrium was much slower, and was observed to drop connections during the class. While dropped connections are a minor annoyance to those reading email or browsing from their personal laptops, they would have been a big problem during the hands-on sessions.

Last but not least, Ginger Caldwell helped NOAA navigate the process of defining and acquiring NCAR supercomputer resources for SSAM, and maintained her sense of humor even

as NOAA refined its requirements during the weeks leading up to the class. Ginger is always a pleasure to work with.

I have put people before machines, but finally I want to thank you for generously providing the computing resources needed for the hands-on sessions. Many of the students were using the NCAR system for the first time, and they had an excellent experience. They will be back as they matriculate through their careers. NCAR also provided the tutorial laptops used in the SSAM classroom, and that made everything easier than it would have been with the students' own laptops.

In summary, NCAR provided superb support for SSAM. Knowing CISL as I do, I expected nothing less, but it was still a pleasure to see. Thanks very much for helping to make SSAM a success.

Sincerely,

A handwritten signature in blue ink, appearing to read "D.A. Randall".

David A. Randall  
Professor

cc: Rich Loft - Director, Technology Development Division  
Anke Kamrath - Director, Operations and Services Division